FLOOD INSURANCE STUDY

VILLAGE OF LOWELLVILLE, OHIO

MAHONING COUNTY

SEPTEMBER 28, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER 390620

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgments	1
1.3	Coordination	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	5
3.0	ENGINEERING METHODS	5
3.1	Hydrologic Analyses	5
3.2	Hydraulic Analyses	6
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	7
4.1	Floodplain Boundaries	7
4.2	Floodways	8
5.0	INSURANCE APPLICATION	9
6.0	FLOOD INSURANCE RATE MAP	9
7.0	OTHER STUDIES	11
8.0	LOCATION OF DATA	11
9.0	REFERENCES AND BIBLIOGRAPHY	11

TABLE OF CONTENTS (continued)

Page

FIGURES

Figure	1	-	Vicinity Map	3
Figure	2	-	Floodway Schematic	9

TABLES

Table	1	-	Summary of Discharges	6
Table	2	-	Floodway Data	10

EXHIBITS

Flood Profiles

Mahoning River Panel 01P

Flood Insurance Rate Map

Elevation Reference Marks

FLOOD INSURANCE STUDY

VILLAGE OF LOWELLVILLE,
MAHONING COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and supersedes a previous Flood Insurance Rate Map for the Village of Lowellville, Mahoning County, Ohio (Reference 1). This information will be used by the community to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by the Federal Emergency Management Agency (FEMA) for purposes of the National Flood Insurance Program. The data were identified as applicable at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, FEMA, Chicago, Illinois, for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from the U.S. Army Corps of Engineers (COE), Pittsburgh District.

1.3 Coordination

Coordination of this study involved Notice of Initiation letters, public meetings, and incidental meetings with village officials. Notice of Initiation of Study letters dated August 19, 1977 announced the start of the study and were sent to all Federal, State, county, and local government agencies and

private firms that could possibly provide input to the study. A meeting was held on September 1, 1976, with community officials, FEMA and COE representatives to discuss the scope of the study.

On November 2, 1989, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Lowellville, Mahoning County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based on the extent and validity of available existing hydrologic and hydraulic data.

Flooding caused by overflow of the Mahoning River was studied in detail.

2.2 Community Description

The Village of Lowellville is in northeastern Mahoning County in northeastern Ohio, approximately 7 miles southeast of Youngstown, Ohio. The Mahoning River flows through the center of Lowellville in a southeasterly direction. Lowellville is bounded on the north, east and south by unincorporated areas of Mahoning County and by the City of Struthers on the west. The community is served by State Route 289 and by the Pittsburgh and Lake Erie Railroad, CSX railroad and Conrail. The 1980 population of Lowellville was reported to be 1,558 (Reference 2).

The climate for the Village of Lowellville is temperate with seasonal variation in temperature. The area is geographically located in a region of variable air mass activity, being subjected to both polar and tropical continental, and maritime air mass invasion. Weather is usually moderate, but may undergo frequent and rapid changes resulting from passage of fronts. Measurable precipitation occurs about 149 days per year and amounts to about 38 inches. Temperatures range from an average of 31 degrees Fahrenheit (°F) in January to an average of 74°F in July.

The Mahoning River, with a total drainage area of 1,140 square miles, joins with the Shenango River at New Castle, Pennsylvania, to form the Beaver River. It has its source in Columbiana County, Ohio, and flows generally northeast from Alliance in Stark County to near the City of Warren in Trumbull County, being impounded along the way by the Berlin-Milton Reservoir system. It then flows generally southeast from Warren, through Trumbull and Mahoning Counties to its mouth at New Castle, in Lawrence County, Pennsylvania.

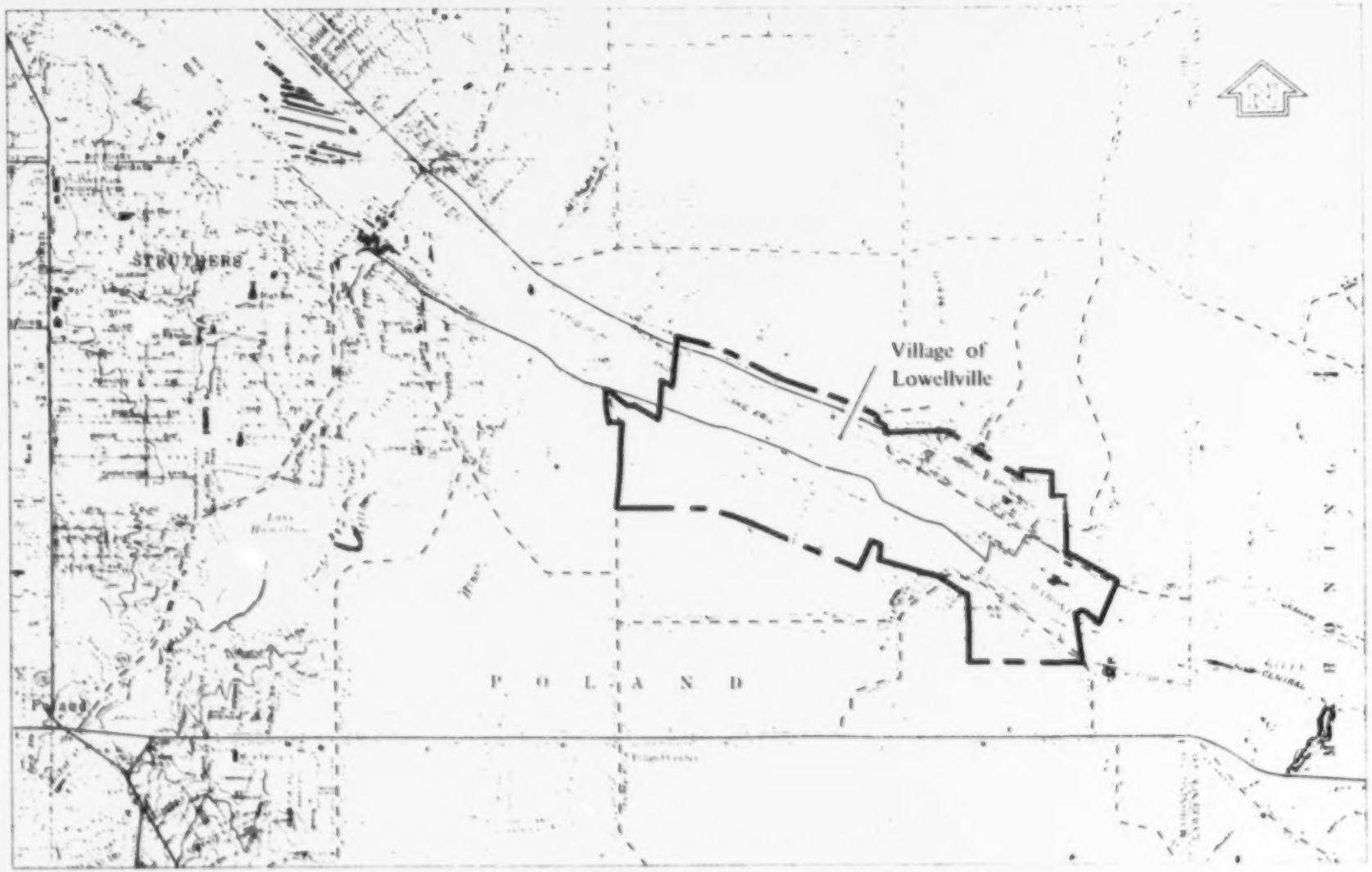


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF LOWELLVILLE, OH
(MAHONING CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

The Mahoning River watershed upstream of Lowellville is somewhat rectangular with an average length of 36 miles and an average width of 29.6 miles. The moderately wide floodplains and relatively flat river gradient are modifying and retarding factors of flood flow, resulting in prolonged critical river heights. The average slope of the Mahoning River within Lowellville is about 4 feet per mile. Local relief from the streambed generally does not exceed 300 feet.

Development in the floodplain is generally broad and heavily industrialized.

2.3 Principal Flood Problems

The history of flooding on the Mahoning River indicates that floods can occur during any season of the year, although the main flood season is usually December through April. Most of the floods that occur during this period are the result of heavy rain and snowmelt. Summer floods usually result from intense thunderstorm rainfall, and may be very local in nature. Summer floods are rare on the Mahoning River. Duration of flooding is relatively short on most small streams in the Mahoning River basin. The duration of flooding on the Mahoning River, however, is much longer. During the flood of January 1959, the flood peak on the Mahoning River at Lowellville did not occur until 30 hours after the flood rise began. This flood rose at a maximum rate of 1.5 feet per hour, and remained out of banks 77 hours. The greatest known flood on the Mahoning River occurred in March 1913. The following tabulation shows some major floods on the Mahoning River within the study area.

HIGHEST FLOODS ON MAHONING RIVER AT LOWELLVILLE (MILE 12.92)

DATE OF CREST	ACTUAL STAGE FEET	NATURAL RECURRENCE INTERVAL (c) YEARS
March 26, 1913	20.0(a)	200
January 21, 1959	16.0(b)	45
May 27, 1946	13.7	10
January 27, 1952	12.0	8
February 11, 1959	12.0	6
May 13, 1956	11.5	8
April 15, 1972	11.0	5
October 16, 1954	11.0	3
March 10, 1964	10.8	9
February 18, 1976	10.7	6

Gage Zero Datum = 796.84 feet National Geodetic Vertical Datum of 1929 (NGVD).

(a) Based on high-water marks.

(b) Actual gage height of 14.4 feet affected by ice. Gage height of 16.0 feet estimated from high water marks.

(c) Without flood control dams.

2.4 Flood Protection Measures

The COE, Pittsburgh District, built, operates and maintains three multipurpose dams in the Mahoning River basin upstream of the study area. These, together with their respective dates of beginning operation, and the drainage area controlled, are as follows: Berlin-Milton Reservoir system on the Mahoning River, July 1943, 276 square miles; Michael J. Kirum Reservoir on the West Branch Mahoning River, February 1967, 80.5 square miles; and Mosquito Creek Reservoir on Mosquito Creek, April 1944, 97.4 square miles. Milton Dam, built in 1917, and owned by the City of Youngstown, is operated in conjunction with Berlin Dam to form the single operating unit of the Berlin-Milton Reservoir system. This network of dams reduces major floods in the study area by an average of 3 to 5 feet.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

For the Mahoning River, flood flow frequency data were based on the statistical analysis of stage and discharge records at the U.S. Geological Survey (USGS) gaging station located approximately 150 feet upstream of the First Street bridge at Lowellville, Ohio (Reference 3). The gage has been in operation since October 1942. The wire weight gage was replaced by a

recording gage in October 1944. The analysis covered 19 years (1945 through 1963) of continuous record.

The effects the of Berlin-Milton, M.J. Kirwan, and Mosquito Creek Dams were added to the actual peak flows at Lowellville to obtain the natural peak flows. These flows were used to compute natural frequency curves at the Lowellville gage. The natural frequency flows were adjusted by average reduction curves to reflect reductions by the Berlin-Milton, M.J. Kirwan, and Mosquito Creek Dams.

The analysis followed the standard log-Pearson Type III method as outlined by the U.S. Water Resources Council Bulletin No. 17A (Reference 4).

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MAHONING RIVER at First Street	1,073	15,800	24,600	29,800	44,500

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-sectional data for the Mahoning River were taken from soundings and topography given on COE maps dated December 24, 1964, for the Lake Erie - Ohio River Canal, Pittsburgh - Ashtabula Route Plan. Further field checks were made if any information was questionable or if a reach required specific roughness inspection and evaluations.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") were chosen on the basis of verification of roughness requirements to reproduce profiles for known floods for which high-water marks were obtained and flow quantities were measured or easily calculated. The Mahoning River channel coefficients range from 0.026 to 0.055 and the overbank values range from 0.053 to 0.07.

Water-surface profiles were developed using HEC-2, a step-backwater method (Reference 5). Profiles were determined for the frequency flows based on a roughness-discharge relationship developed from the reproduction of historical flood profiles of March 1913, November 1970, and January 1959 flows.

Starting elevations on the Mahoning River were based on a stage-discharge relationship at the Hill Church Road bridge in Hillsville which was obtained from known high-water marks and discharges. The starting water surface at the downstream corporate boundary was obtained by a continuation of the profile computations from the Hillsville rating curve.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2400 with a contour interval of 20 feet (Reference 6).

The 100-year and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, A1-, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point within the community. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

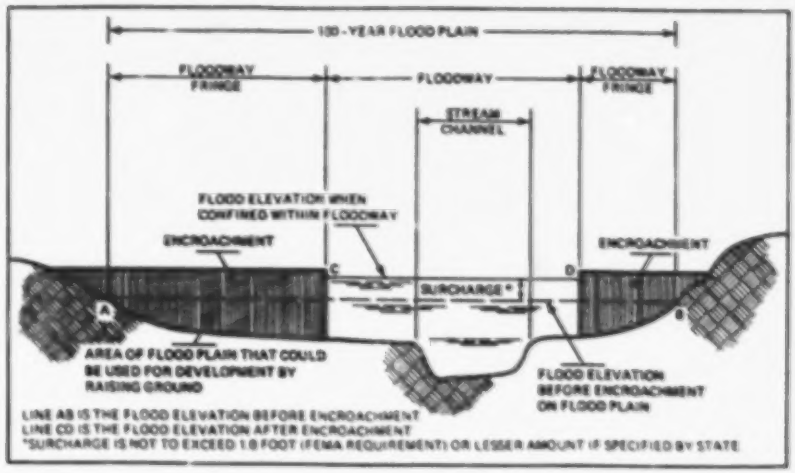

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
MAHONING RIVER								
A	12.59	365	4728	6.3	811.0	811.0	811.5	0.5
B	12.87	320	4149	7.2	812.3	812.3	812.7	0.4
C	13.07	260	3645	8.2	815.2	815.2	815.3	0.1
D	13.35	250	3409	8.7	816.6	816.6	816.7	0.1
E	13.72	365	5407	5.5	818.7	818.7	818.8	0.1
F	13.86	345	4979	6.0	818.9	818.9	819.1	0.2
G	14.10	310	4433	6.7	819.5	819.5	819.6	0.1
H	14.33	285	4221	7.1	820.1	820.1	820.3	0.2
I	14.41	295	4561	6.5	820.5	820.5	820.6	0.1

[1]MILES ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF LOWELLVILLE, OH
(MAHONING CO.)

FLOODWAY DATA

MAHONING RIVER

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Studies published for Mahoning County, Ohio, and the City of Struthers, Ohio (References 7 and 8) are in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Insurance Rate Map for the Village of Lowellville, Mahoning County, Ohio (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Rate Map, Village of Lowellville, Mahoning County, Ohio, July 1981.

2. U.S. Department of Commerce, Bureau of Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

3. U.S. Geological Survey, Mahoning River at Lowellville, Ohio, Gage Data since October 1944, unpublished.

4. U.S. Water Resources Council, Bulletin No. 17A, Guidelines for Determining Flood Flow Frequency, Washington, D.C., June 1977.

5. U.S. Army Corps of Engineers, HEC-2-J2-L212 Backwater Program, October 1966.

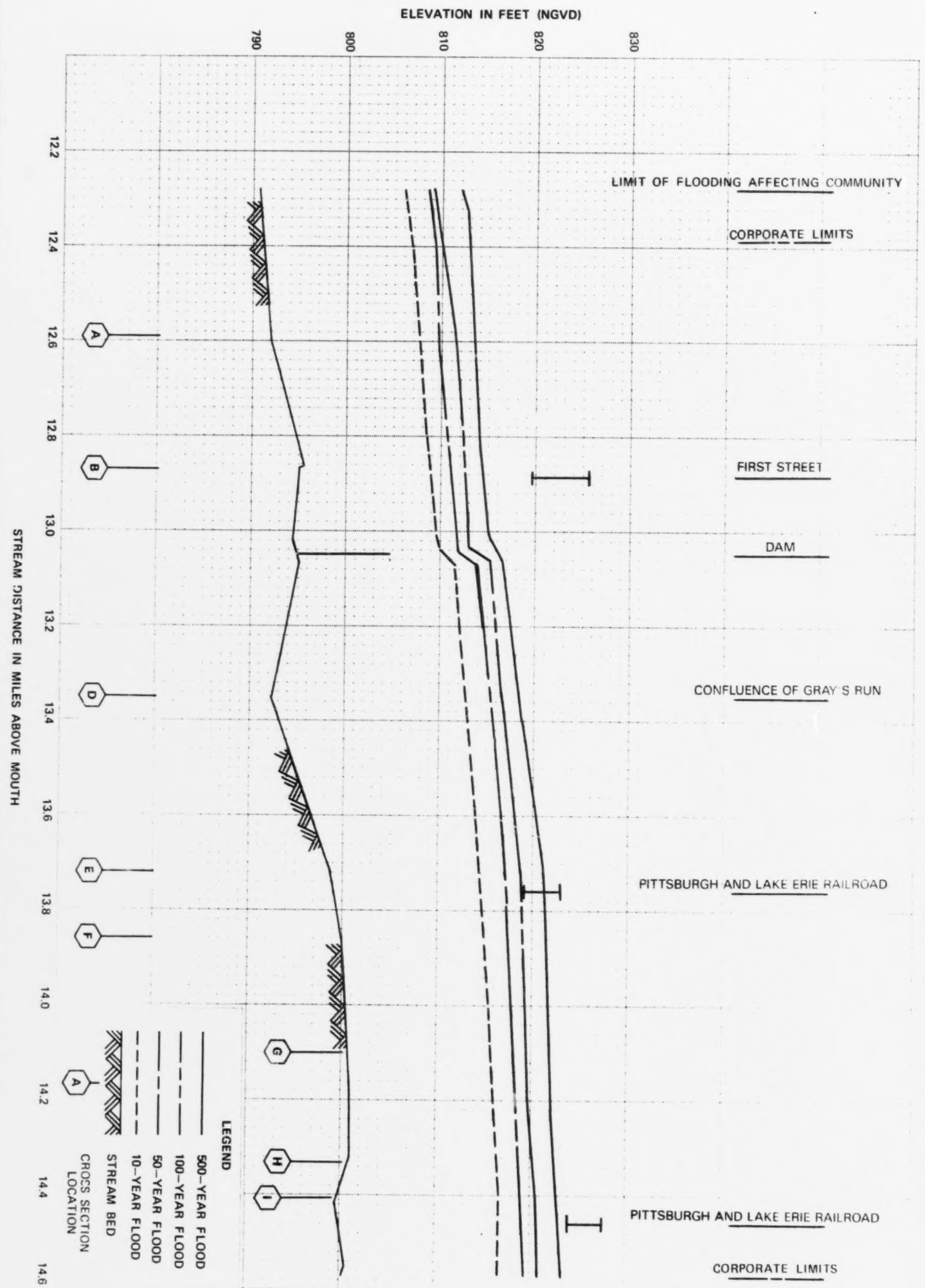
6. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 Feet: Campbell, Ohio, 1963, photorevised 1970.

7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Mahoning County, Unincorporated Areas, Ohio, February 1979.

8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Struthers, Mahoning County, Ohio, November 1980.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	835.87	nail hole in top of 2-inch square hub flush with grade located on south side of Cooper Avenue about 450 feet west of intersection of Cooper Avenue and Dickson Street
2	0001	835.25	nail hole in top of 2-inch square hub flush with ground located about 65 feet south of intersection of Cooper Avenue and Elizabeth Street
3	0001	829.98	standard disk set in center of northeast concrete headwall of 36-inch culvert located approximately 100 feet southeast of intersection of Cooper Avenue and unnamed road
4	0001	825.17	U.S. Army Corps of Engineers pin stamped "M19 1962" set 0.3 foot below grade located about 250 feet west of intersection of McGill Street and Liberty Street
5	0001	824.12	U.S. Geological Survey disk set vertically located at intersection of 2nd Street and Water Street



01P

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF LOWELLVILLE, OH
(MAHONING CO.)

FLOOD PROFILES

MAHONING RIVER